

TRANSACTIONS

OF THE

GEOLOGICAL SOCIETY OF GLASGOW.

NO. XVIII.—ON THE POST-PLIOCENE BEDS OF THE IRVINE VALLEY, KILMAURS, AND DREGHORN DISTRICTS. BY ROBERT CRAIG, LANGSIDE, BEITH, *Corresponding Member*.

[Read 13th January, 1887.]

Introduction.—On 12th January, 1882, Mr. John Young, F.G.S., and the writer, exhibited before this Society a fragment of a tusk of *Elephas primigenius*, Blum., and some shells, which had been found in sinking a pit on the farm of Drummuir, Dreghorn. These remains had been brought to our notice by Mr. Thomas Shore, at that time a clerk in the employment of Messrs. Merry & Cuninghame, the owners of the pit. In answer to a query, he stated that the shells, and “piece of wood,” for which the tusk was at first mistaken, had been found in a bed of sand resting upon Carboniferous strata, and below 80 feet of Boulder-clay; but as regards the statement that the shell bed rested upon Carboniferous strata, this was afterwards discovered to be incorrect.

This find was an important one, Drummuir being nearly three miles south-west of the old quarry at Greenhill, where so many tusks of the Mammoth were discovered about sixty years ago, and I at once began to make further investigations. On proceeding to the place, I found that the discovery had been made in No. 5 pit, Drummuir, Warwickhill Colliery, belonging to the Glengarnock Iron Company, and I received from Mr. John Cuninghame, one of the partners, not only full permission to examine the pit, but also kind assistance by the loan of surface sections of numerous bores, which had been put down between Kilmarnock and Irvine,

for comparison with pit sections put down in the same district. The manager, the late Mr. Walker, also gave me every facility and help in carrying out my investigations.

Section of the Pit No. 5, Drummuir.—The following section gives, in descending order, the beds cut through before the Carboniferous strata were reached :—

1st. Boulder-clay, 76 feet.

2nd. Stratified Sand and Clay, 2 feet.

3rd. Sand, about 4 feet, the Mammoth and Shell bed.

4th. Sands and Gravels, 20 feet.

The first of these beds is the Boulder-clay of the district, a hard stony clay, impervious to water, and of a light-brown colour, with a small percentage of carried rocks.

The second, Stratified Sand and Clay, is a series of very fine laminations of alternate layers of sand and clay, connected with the Boulder-clay. The clay layers at the bottom of this bed are of fine mud from $\frac{1}{16}$ to $\frac{1}{8}$ inch thick, the sand being 1 inch thick ; but this rapidly changes, the layers of clay getting thicker, and the sand thinner, so that in the height of 2 feet the sand has fallen into very thin laminæ, while the clay layers have thickened, imperceptibly running into Boulder-clay of the same character as that overlying this bed. This is no new feature in this district. The pit-sinker, Mr. Love, informed me that he had found this laminated sand and coarse clay, in a bed 6 feet thick in the bottom of the Boulder-clay ; and another sinker, Thomas Crawford, who has put down a number of the pits in this district, fully corroborated Love's statement. These stratified beds are not always present, but they have been found in a few of the pits. I found fragments of broken shells as high as the 2 feet, and I picked out a whole valve of *Astarte sulcata*, Da Costa, of large size, in sand about the middle of the bed.

The third bed of the section is the fossiliferous one, about 4 feet in thickness, though, as no sharp line divides it from the sand below, this depth is assumed, but shells are found throughout the whole 4 feet, if not some inches deeper. About a foot on the top is fuller of mud than it is below this line, and in the bottom of this muddy sand the Mammoth tusk was found.

The Sands and Gravels, the fourth bed of the section, form a series of unfossiliferous beds, 20 feet thick, and hold from top to bottom a small percentage of, apparently, West Highland rocks.

The Mammoth and Shell Bed.—In sinking through the fossiliferous sand (the 3rd of the pit section) the sinkers came upon the tusk, lying diagonally across the shaft on a horizon agreeing with the bedding of the sand, but, mistaking it for a piece of fossil wood, they broke it up, and but for the curiosity of a joiner and another individual, it would never have been further heard of. One of the fragments, which came into my hands through the clerk, Mr. Thomas Shore, I sent to my friend, Mr. John Young, who at once discovered its value, and it was secured for the Hunterian Museum, along with some of the shells found with it. I was informed by Mr. Love, the pit-sinker who found it, that the total length of the tusk was about 5 feet, and its greatest diameter about 6 inches. He said that about 2 feet of the root or base end was in a state of decay, and fell into dust on being lifted. This was found to be correct, from the large quantity of dentine fibre discovered by washing parcels of the sand in which the tusk had been embedded.

This washing and examination of the sand was done by Mr. David Robertson, F.G.S., to whose kindness I am indebted for the list of fossils from No. 5 pit, Drummuir, given in the list appended to this paper. In the different parcels of sand sent to him Mr. Robertson found eight genera and ten species of Mollusca; twenty genera and thirty species of Foraminifera; and five genera and seven species of Ostracoda. There were also found by him fish scales, the elytra of a beetle, and the seeds of a plant. In two parcels taken from the group of Sands and Gravels, Mr. Robertson found five genera and eight species of Foraminifera, and a fragment of an Ostracod; but, as they are identical with those found in the fossiliferous bed, and as the sand was taken from the pit mouth shortly after a severe storm of wind, there is a probability that they may have been blown from the sand of the fossiliferous bed, which was lying close to the pit mouth, on to the end of the heap which had come from the Sands and Gravels. As, with this doubtful exception, this group of beds, the 4th of the No. 5 pit section, is unfossiliferous, I have not placed the shells found in it in the list.

The Mammoth and Shell bed, the 3rd of this section, differs from the section of No. 9 pit, Woodhill, as given by Mr. Young and the author in a paper read before this Society on 1st April, 1869, and printed in the *Transactions*, vol. iii., p. 310; and it also

differs from the section of the stratified beds, or bed, beneath the Boulder-clay in the old quarry at Greenhill, described by Dr. James Bryce in a paper read before the Geological Society of London on 25th January, 1866, and published in the *Quarterly Journal*, vol. xxi., p. 213. In his section, Dr. Bryce makes an arbitrary division of the deposits found here beneath the Boulder-clay into three beds of distinct character, as follows :—

No. 2. Hard gravel; thickness, 2 feet; this rests on the Carboniferous strata.

„ 3. Fine blue clay, Mammoth bed; thickness, 9 inches.

„ 4. Sand, 6 to 18 inches.

The section given by Mr. Young and myself of No. 9 pit, Woodhill, already referred to, is almost exactly the same as that given by Dr. Bryce. It was furnished by Mr. Yates, jun., and was published by us in all confidence at the time. However, when the pit was worked out, and while filling it up, Mr. Yates, in accordance with a request which I made to him for further examination of the fossiliferous bed, took out the boarding from the shaft opposite this bed, and found it to be different from the published section. Unfortunately, after a few buckets-full of the sand had been removed, the side of the pit slipped in, stopping further examination, but enough was seen to prove that there was no intercalated “peaty bed,” and that the sand was fossiliferous from top to bottom. The only thing approaching peaty matter was that the sand was darker in colour, and was muddier on the top of the bed as it neared the Boulder-clay. Thus, the section of No. 9 pit, Woodhill, proved to be very similar in character to the one in an air shaft, distant from it to the south-east 150 yards (not 250, as in our paper, by an overlooked typographical error).

Recent occurrences have also thrown doubts upon the arbitrary division of the Mammoth bed in the Greenhill old quarry into three beds of distinct character, as given by Dr. Bryce in his section. It appears that he had only one object in view in opening up the old quarry, which at that time had been closed for about twenty years, and that was to verify whether the tusks were found in true Boulder-clay, or in a bed of stratified clay. Roxbrough, the lessee of the new quarry there, had worked in the old quarry, and was the “aged quarryman” who, Dr. Bryce said, gave him the section, which agreed with the one furnished him by Mr. Turner, the Duke of Portland’s factor. Roxbrough was also employed to

re-open a pit in the old quarry, and it is strange that Dr. Bryce did not take a measurement of the re-opened section. That he did not he admitted in his paper to the Geological Society, according to the report in the *Geological Magazine*, vol. ii., p. 127, which says that "Dr. Bryce stated that the section had been sent by Mr. Turner." Mr. Turner, who is still living, corroborates this; and Roxbrough always said that Dr. Bryce did not take the section, as part of it had slipped in before he arrived. Yet Dr. Bryce speaks of having examined the sand bed, and that he found it thinned out eastward and westward. Roxbrough, no doubt, gave the section with the three distinct beds, and believed that he gave them correctly, although his memory was being influenced by the remembrance of conversations that he had heard. He was not in the quarry when any of the tusks were found, but he had heard from men who visited the quarry that the Mammoth was a land animal, and would be found on old land. This idea had got hold of all the quarrymen, pitsinkers, and others in the district, and the consequence was the invention of a "peaty bed" below the shell bed, in which the Mammoth remains were found.

The late discovery by Mr. Bennie, of the Geological Survey, of two bits of clay from the Elephant bed, Kilmaurs, is of high value. They had been sent to the Wernerian Society, along with part of a tusk, by Mr. Alexander Hood, surgeon, Kilmarnock, in 1817; and had been taken that year from the clay in the Greenhill quarry, in which the tusks were discovered. They had been properly labelled. They had been laid aside for nearly fifty years, when, fortunately, Mr. Bennie came across them with their labels entire, and examined them by washing. The result was given by him in a paper read before the Royal Physical Society of Edinburgh, on 20th of May, 1885, which was published in the *Proceedings* of the Society for that year, p. 451. From this paper I extract this and the following remarks which refer to it. In the examination of one of the pieces Mr. Bennie found one valve of *Astarte compressa* and a few valves of *Leda pygmæa*, with eight genera and nine species of Foraminifera, and five genera and ten species of Ostracoda. A number of seeds of plants and fragments of beetles were found in the other piece of clay, but no marine organisms were reported. This discovery is of great value, not only throwing light upon this celebrated bed, but in re-directing the attention of geologists to the report of the late Mr. Johnston of Redburn that

marine shells were found in the clay in which the tusks were discovered, which had been lost sight of in consequence of the publication of Dr. Bryce's section.

Mr. Bald, in bringing the discovery of Mammoth tusks before the Wernerian Society (see *Memoirs*, vol. iv., p. 64), and apparently quoting from Mr. Johnston's report, states that the tusks were found in a clay of light brown colour, which had changed into a dark brown around the remains, with an offensive smell. "The tusks were found lying in a horizontal position with several small bones near them, and it is particularly to be remarked that several marine shells were found among the dark-coloured earth."

Mr. Bennie's discovery, coming as contributory evidence in support of Mr. Johnston's important remark, destroyed Dr. Bryce's arbitrary division of the stratified material beneath the Boulder-clay in the Greenhill old quarry into three beds of distinct character. This, when taken with the other sections of the bed, is sufficient to prove that marine shells are not confined to the sand said to rest upon the Mammoth clay bed, but that they also are found in this so-called clay bed itself. And if ever an opportunity presents itself for the examination of this section, I have not a doubt that shells will also be found in the run gravel below the clay, as was the case in No. 9 pit, Woodhill, as now ascertained.

In summing up the evidence, I have arrived at the following conclusions regarding the fossiliferous bed:—The shell bed in the two pits on Woodhill, and the Mammoth and Shell bed in the old quarry at Greenhill, and in No. 5 pit, Drummuir, are all parts of the same bed. There is a distinctively uniform character running through them that cannot be overlooked. Remains of a land fauna and flora, carried in by mechanical means, have been deposited in this bed of otherwise true marine character, and reached their greatest extent when the bed was about two-thirds deposited, in which position the Mammoth remains and the largest amount of plant remains were found. Marine shells, etc., being found mixed up with these prove that no cessation in the deposition of this marine bed had taken place. After this time an increased inflow of land organisms and an increase of mud have taken place, and have continued, until the bed was finally brought to a close by the advance of land ice and the deposition of the Boulder-clay.

This bed has been certainly found in four pits, and is reported

to have been found in another (doubtfully) besides the old quarry on Greenhill. The fourth pit was No. 1, Finnie's Colliery, on the side of the Carmel, half a mile or so below Crosshouse; and the other, which I regard as doubtful, was near (but a little to the north-west of) Crosshouse. Having been only found in these few places amidst a great many pits sunk around, it is evident that these are only patches of the bed preserved in hollows of the underlying sands and gravels.

Mr. Bennie, in his paper mentioned above, states that plant remains were only found in one of the pieces of clay, and, referring to the marine fossils found in the other, says "the one speaks of the sea and the other of the land." But this is rather obscure, as it is not plain whether he is speaking of this clay being from an old land surface, or only of the fossils coming from the land. Whatever the meaning, there is no evidence that any surface of old land exists either in this bed or in any of the sand and gravel beds lying beneath the Boulder-clay. Still, the presence of a land, or fresh-water, flora, and the remains of land animals, show that land was at no great distance.

Age and Position.—It is a curious fact that up to the publication of Dr. Bryce's paper geologists wrote as if the tusks of the Mammoth discovered at Greenhill were all found in the Boulder-clay, or Till. Mr. Bald, among the first to notice the discovery, thought that they were found in recent deposits above the Till. Dr. Scoular, who visited the quarry, and picked half a molar of the Mammoth from the removed clay, but neither perceived sand nor shells, stated that the material in which the tusks and half molar were found was the true Till, or Boulder-clay. This statement was accepted by geologists until Dr. Bryce, who had come to doubt its correctness, applied in 1864 to Mr. Turner, factor for the estate, to re-open a section of the old quarry, in which the tusks had been found, and so prove the correctness of Dr. Scoular's statement. This was accordingly done, but beyond satisfying himself that there was stratified material below the Boulder-clay, in which old quarrymen said the tusks were found, his work threw no new light upon the question. Finding that the tusks were found in strata beneath the Boulder-clay, Dr. Bryce put down the bed as the equivalent of the Cromer Forest-bed of Norfolk, and consequently pre-glacial. Mr. Young and myself, in the paper already quoted, after a close

examination of the district and position of the beds in relation to the glacial clay, concluded that the Mammoth and Shell bed was pre-glacial. In 1872 the officers of the Geological Survey published an Explanatory *Memoir* to sheet 22 of the Survey, and in noticing the discoveries at Greenhill, state this bed to be inter-glacial. Dr. James Geikie, in his "Great Ice Age," accepts this view, and puts the bed down as inter-glacial; while in the already quoted paper by Mr. James Bennie he not only strongly upholds the same theory, but advocates its extension.

It may be difficult to find a term satisfactory for all parties, but after weighing all the available evidence, and reviewing the conclusions of the inter-glacialists regarding this bed, at least, the theory may be dismissed with the Scotch verdict of "not proven." If the inter-glacial position of this bed be founded upon the evidence given in the Survey *Memoir* already quoted, as it appears to be, then the evidence is defective. The *Memoir*, after noticing that some observers had compared the horizon of the bed to the well-known Forest bed of Cromer in Norfolk, says, "There are, however, no grounds for this inference." It continues, "An examination of the numerous bores and pit sections . . . in the Kilmaurs district shows that the Boulder-clay there contains inter-stratified beds of sand, gravel, and clay. Where the level of the surface of the solid rocks rises towards the surface of the ground, the intercalated strata of sand die off the slope until the rock comes to be covered directly by the overlying Boulder-clay. Where, on the other hand, the level of the rock sinks, as it does southwards and westwards, it passes beneath the horizon of the sand-beds, and a lower Boulder-clay makes its appearance under these beds. There can be no doubt that the strata containing the organic remains were formed during the deposition of the Boulder-clay which is found both beneath and above them," etc. It was, no doubt, beyond the scope of the *Memoir* to furnish details, yet, in a question of importance such as this, one or two sections might have been given where this lower Boulder-clay exists. If I understand the above rightly, the "sand, gravel, and clay" refers to the beds of sands and gravels which fill the valley of the Irvine beneath the Boulder-clay, and extend from near Shewalton to the village of Galston. Their breadth is very irregular, never more than one mile or so, with considerable gaps, and they run in depth from a mere nothing to nearly 40 feet. In no single pit that I have

known, and I have been on the outlook now for a quarter of a century at least, has anything that could be called Boulder-clay ever been found beneath them, but they have always been found resting upon the Carboniferous strata. It is true that in a very few bores, the borers have registered in their journals, as existing in these sands and gravels, intercalated beds, as "gravel with clay," "gravel and clay," and "stony clay." Wherever these bores have been proved by pit, or open, sections, no material corresponding to Boulder-clay has been found. In a bore put down close to where No. 5 pit, Drummuir, was afterwards sunk, the borer had registered three kinds of Boulder-clay intercalated by beds of gravel, and $8\frac{1}{2}$ feet of "gravel mixed with clay" beneath the sands and gravels, and resting on the Carboniferous strata. When the pit was afterwards sunk the Boulder-clay was found persistent in character throughout, and the $8\frac{1}{2}$ feet under the sands and gravels was gravel of a clean and washed appearance, with no clay whatever mixed in it. In no pit, as already stated, have I known Boulder-clay, or clay of any kind, to have been met with, either beneath these sands and gravels, or intercalated with them. They, however, differ in character in different pits; in one they may be, and this is their general character, pure sand and gravel; in another they are nearly pure sand so indurated that a shaft can be sunk 6 feet without boarding; while in a third soft loose sand mixed with mud predominates. One thing the open sections prove, that bores not attended by experts are totally valueless in the settlement of delicate geological questions.

Conclusions.—Taking all this negative evidence into consideration, with the positive evidence now available, I see no cause to change the conclusions arrived at in our joint paper of 1869. Dr. Bryce's surmise that the fossiliferous bed may be the equivalent in age of the Cromer Forest-bed is, in my opinion, not far from being correct. I would even put these sands and gravels, with the fossiliferous sand bed, as of earlier age than this Forest bed, but it is impossible to correlate the glacial deposits of Scotland with those of England for any practicable purpose. From the first inflow of ice until its final disappearance deposition and destruction must have been at work. While deposition was active in one locality destruction would be as active in another where there was not water of sufficient depth to act as a preservative. Still there is a general character between these beds of the Irvine valley, and the

beds in the Bure valley, near Norfolk. Both form a series of beds of sands and gravels, capped with a fossiliferous sand bed holding marine fossils. Both underlie the great mass of glacial deposits in their respective localities; and the shell *Tellina balthica*, Linn., makes its first appearance in English strata in the Bure valley beds, and its first appearance in Scottish strata in the Irvine valley. As this shell is found in all the higher fossiliferous glacial clays, and is still living in British waters, its presence is no proof of the age of this bed; still the coincidence is remarkable when the inferior position of both beds to the Boulder-clay of their respective localities is considered.

In thus putting this series of Sands and Gravels, with the Mammoth and Shell bed, at the very base of the glacial deposits, I admit that it supposes a submergence at the commencement of the glacial period, a subsidence not recognized by any Scottish geologist, so far as I remember. But the stratified layers of alternate sand and clay at the bottom of the Boulder-clay in the Drummuir pit is evidence of deep water, otherwise these laminated strata would have been destroyed by the ice that deposited the 76 feet bed of clay and stones which overlies them. The greater number of the Foraminifera found in the fossiliferous bed are still living, according to Mr. H. B. Brady, off the Shetland Islands, and to the north of them, in water of from 75 to 90 fathoms. A few are of brackish water habitat, but these might have been flooded in, as in all probability the tusks and land plants were. The increase of mud in the sand above the line of horizon on which the tusk was found in No. 5 pit, Drummuir, may indicate the approach of the ice. As it advanced, driving the land animals before it, many of them might be caught in a *cul-de-sac*, and perish of hunger, which would thus account for so many of their remains being found here.

It has been supposed by those who hold this bed to be interglacial that the group of Sands and Gravels beneath the fossiliferous bed is a re-wash from a lower Boulder-clay. But if this be so, where are the beds of fine clay which would be associated with the sands and gravels, and which are always so found in the re-washes that lie above the Boulder-clay? Their absence is a deathblow to the supposition; and as for the carried rocks, they may owe their present position to the carrying power of weeds attached to them, a power quite sufficient to account for the presence of the largest of them that I have yet seen.

Note.—On 3rd March, 1872, I read a paper before this Society, "On the Glacial Deposits of North Ayrshire," etc., which was published in the *Transactions*, vol. iv., p. 138. It may be thought that the present paper is a recantation of the opinions I then advocated, but that is not so, and I still adhere to the general views set forth in that paper. But I wish to correct one error which I then committed in putting the Kilmaurs Mammoth bed on the top of the deposits of the lower glaciation, instead of placing it at the bottom of them, as I now do. When I placed the Mammoth bed at Greenhill between the two glaciations I was working on defective evidence, and had accepted this bed as a patch of the old land which I had found in the Beith district. The correction of that evidence by the re-examination of No. 9 pit, Woodhill, the new section in No. 5 pit, Drummuir, and the finding of marine fossils in what was supposed to be the land surface in the Greenhill quarry, all go to prove that the bed is marine, and that it lies at the bottom of the glacial deposits, or rather in the earlier stages of the glacial period. With this explanation I have now no farther alteration to make on my former paper, which, like all geological papers, must stand or fall by the evidence that may turn up hereafter.

On the following pages will be found a list of organisms from the Fossiliferous Bed beneath the Boulder-clay, referred to in this paper.

LIST OF ORGANISMS FROM THE FOSSILIFEROUS BED BENEATH
THE BOULDER-CLAY IN THE KILMAURS AND DREGHORN
DISTRICT.

	Old Quarry, Greenhill.	No. 9 Pit, Woodhill.	Air Pit, Woodhill.	No. 5 Pit, Drummuir.
MAMMALIA.				
<i>Elephas primigenius</i> , Blum. (tusks).	x			x
<i>Cervus tarandus</i> , Linn. (horns).	x			
MOLLUSCA.				
CONCHIFERA.				
<i>Cyprina Islandica</i> , Linn.		x		x
<i>Leda oblonga</i> (<i>L. pernula</i>), Müller.		x		
„ <i>pygmaea</i> , Munst.	x		x	
<i>Pecten Islandicus</i> , Linn.		x		
<i>Nucula tenuis</i> , Mont.				x
<i>Astarte compressa</i> , Mont.	x	x	x	x
„ <i>sulcata</i> , Da Costa.		x		x
<i>Tellina calcaria</i> , Chemn.		x		
„ <i>balthica</i> , Linn.				x
<i>Mya truncata</i> , Linn.				x
GASTEROPODA.				
<i>Littorina littorea</i> , Linn.		x		x
<i>Turritella terebra</i> , Linn.				x
<i>Natica Grænlantica</i> , Beck.		x		
„ <i>affinis</i> , Gmel.		x		
<i>Fusus</i> , sp. (?)				x
FORAMINIFERA (IMPERFORATA).				
MILIOLIDA.				
<i>Biloculina elongata</i> , D'Orb.				x
<i>Miliolina seminulum</i> , Linn.	x			
FORAMINIFERA (PERFORATA).				
LAGENIDA.				
<i>Lagena globosa</i> , Mont.				x

	Old Quarry, Greenhill.	No. 9 Pit, Woodhill.	Air Pit, Woodhill.	No. 5 Pit, Drummulr.
LAGENIDA—Continued.				
<i>Lagenà marginata</i> , W. and J.			x	x
„ <i>melo</i> , D'Orb.				x
„ <i>Williamsoni</i> , Alcock.			x	x
„ <i>sulcata</i> , W. and J.			x	x
„ „ <i>var. lineata</i> , Will.				x
<i>Glandulina lævigata</i> , D'Orb.	x			x
<i>Polymorphina lactea</i> , D'Orb.	x			
„ <i>myristiformis</i> , Will.				x
„ <i>sp. (?)</i>				x
<i>Uvigerina angulosa</i> , Will.				x
GLOBIGERINIDA.				
<i>Textularia sagittula</i> , De Franc.				x
<i>Bulimina aculeata</i> , D'Orb.				x
„ <i>marginata</i> , D'Orb.				x
„ <i>pupoides</i> , D'Orb.				x
<i>Cassidulina crassa</i> , D'Orb.	x			x
<i>Planorbulina Ungeriana</i> , D'Orb.				x
<i>Truncatulina lobatula</i> , Walker.	x			
<i>Rotalia Beccarii</i> , Linn.	x			x
NUMMULINIDA.				
<i>Nonionina depressula</i> , W. and J.				x
„ <i>asterizans</i> , F. and J.				x
„ <i>orbicularis</i> , Brady.	x			
„ <i>scapha</i> , F. and M.	x			
<i>Polystomella crispa</i> , Linn.				x
„ <i>striato-punctata</i> , F. and M.	x		x	x
„ <i>sp. (?)</i>				x
CRUSTACEA.				
OSTRACODA.				
<i>Cythere Dunelmensis</i> , Norman.	x			
„ <i>concinna</i> , Jones.	x		x	
„ <i>limicola</i> , Norman.	x			x
„ <i>pellucida</i> , Baird.				x
„ <i>viridis</i> , Müller.	x			x
<i>Cytheridea papillosa</i> , Bosq. (young specimen).	x			x
„ <i>punctillata</i> , Brady.	x		x	x
„ <i>Sorbyana</i> , Jones.	x			

	Old Quarry, Greenhill.	No. 9 Pit, Woodhill.	Air Pit, Woodhill.	No. 5 Pit, Drummuir.
OSTRACODA—Continued.				
<i>Cytheropteron latissimum</i> , Norman.	x			
<i>Cytherura cellulosa</i> , Norman.				x
<i>Eucythere argus</i> , Sars.				x
CIRRIPIEDIA.				
<i>Balanus porcatus</i> , Da Costa.				x
PISCES.				
<i>Fish scales</i> (undetermined).				x
PLANTÆ (SEEDS).				
<i>Potamogeton</i> (allied to <i>P. rufescens</i> , Schard).	x		x	x
" (allied to <i>P. Zizii</i>).	x			
" (allied to <i>P. heterophyllus</i>).	x			
<i>Ranunculus aquatilis</i> .	x		x	
<i>Myriophyllum spicatum</i> , Linn.	x			
<i>Carex</i> , sp. (?)	x			
<i>Potentilla</i> , sp. (?)	x			
<i>Chara</i> , sp. (?)	x			
<i>Isoetes</i> , sp. (?)	x			
INSECTA.				
<i>Beetles</i> (fragments).	x			x

NOTE.—I have much pleasure in stating that this list has been made up by the help of kind friends, whom I have to thank for their valuable aid. The entries in the first column, under Old Quarry, Greenhill, are taken, with Mr. Bennie's consent, from his paper, "On Two Bits of Clay from the Elephant Bed, Kilmaurs." (*Proc. Royal Phys. Soc.*, Edin., vol. viii. p. 451.) Those in the other three columns are the work of Mr. David Robertson, F.G.S., who kindly washed parcels of the sand from the pits, in which he discovered all the Microzoa, and the most of the shells recovered. The existence of seeds in the peaty clay was first demonstrated by Mr. John Young, F.G.S., who in 1869 washed a piece of clay which had been sent with the tusk of 1829 to the Hunterian Museum, finding in it "upwards of 300 seed-cases and seeds of plants, the most abundant being a species of *Potamogeton*, and one of *Ranunculus*, along with a few seeds of *Hippuris*." (See *Trans. Geol. Soc. of Glasgow*, iii., 314.) Mr. Bennie having, in 1884, recovered a bit of the peaty clay sent to Edinburgh with the tusk of 1817, followed Mr. Young's example and washed it, finding the seeds indicated in the first column of the text. (*Proc. Royal Phys. Soc. Edin.*, viii., 451.)